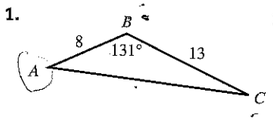
SECTION 5.6 EXERCISES

In Exercises 1–4, solve the triangle.

1.



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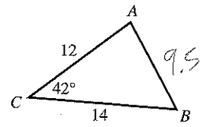

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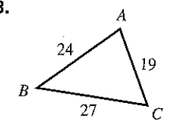

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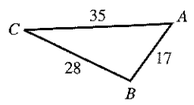


In Exercises 5–16, solve the triangle.

5. $A = 55°,\quad b = 12,\quad c = 7$

6. $B = 35°,\quad a = 43,\quad c = 19$

7. $a = 12,\quad b = 21,\quad C = 95°$

8. $b = 22,\quad c = 31,\quad A = 82°$

9. $a = 1,\quad b = 5,\quad c = 4$

10. $a = 1,\quad b = 5,\quad c = 8$

11. $a = 3.2,\quad b = 7.6,\quad c = 6.4$

12. $a = 9.8,\quad b = 12,\quad c = 23$

13. $A = 42°,\quad a = 7,\quad b = 10$

14. $A = 57°,\quad a = 11,\quad b = 10$

15. $A = 63°,\quad a = 8.6,\quad b = 11.1$

16. $A = 71°,\quad a = 9.3,\quad b = 8.5$

In Exercises 17–20, find the area of the triangle.

17. $A = 47°,\quad b = 32$ ft, $\quad c = 19$ ft

18. $A = 52°,\quad b = 14$ m, $\quad c = 21$ m

19. $B = 101°,\quad a = 10$ cm, $\quad c = 22$ cm

20. $C = 112°,\quad a = 1.8$ in., $\quad b = 5.1$ in.

In Exercises 21–28, decide whether a triangle can be formed with the given side lengths. If so, use Heron's formula to find the area of the triangle.

21. $a = 4,\quad b = 5,\quad c = 8$

22. $a = 5,\quad b = 9,\quad c = 7$

23. $a = 3,\quad b = 5,\quad c = 8$

24. $a = 23,\quad b = 19,\quad c = 12$

25. $a = 19.3,\quad b = 22.5,\quad c = 31$

26. $a = 8.2,\quad b = 12.5,\quad c = 28$

27. $a = 33.4,\quad b = 28.5,\quad c = 22.3$

28. $a = 18.2,\quad b = 17.1,\quad c = 12.3$

29. Find the radian measure of the largest angle in the triangle with sides of 4, 5, and 6.

30. A parallelogram has sides of 18 and 26 ft, and an angle of 39°. Find the shorter diagonal.

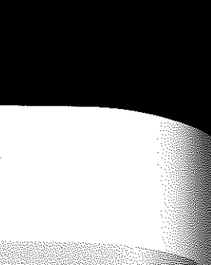
31. Find the area of a regular hexagon inscribed in a circle of radius 12 inches.

32. Find the area of a regular nonagon (9 sides) inscribed in a circle of radius 10 inches.

33. Find the area of a regular hexagon circumscribed about a circle of radius 12 inches. [*Hint*: start by finding the distance from a vertex of the hexagon to the center of the circle.]

34. Find the area of a regular nonagon (9 sides) circumscribed about a circle of radius 10 inches.

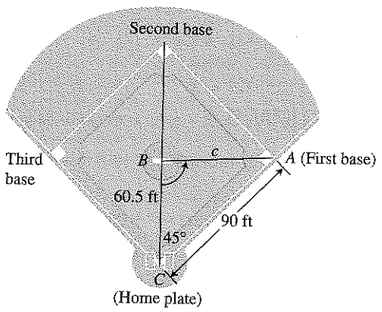
35. Measuring Distance Indirectly Juan wants to find the distance between two points A and B on opposite sides of a building. He locates a point C that is 110 ft from A and 160 ft from B, as illustrated in the figure. If the angle at C is 54°, find distance AB.



36. Designing a Baseball Field

(a) Find the distance from the center of the front edge of the pitcher's rubber to the far corner of second base. How does this distance compare with the distance from the pitcher's rubber to first base? (See Example 5.)

(b) Find $\angle B$ in $\triangle ABC$.

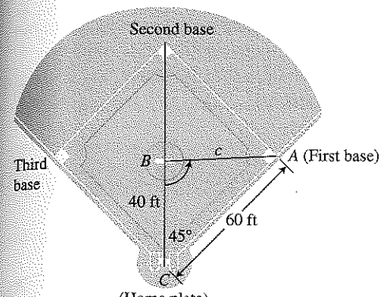


37. Designing a Softball Field In softball, adjacent bases are 60 ft apart. The distance from the center of the front edge of the pitcher's rubber to the far corner of home plate is 40 ft.

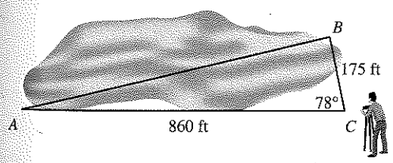
(a) Find the distance from the center of the pitcher's rubber to the far corner of first base.

(b) Find the distance from the center of the pitcher's rubber to the far corner of second base.

(c) Find $\angle B$ in $\triangle ABC$.



38. Surveyor's Calculations Tony must find the distance from A to B on opposite sides of a lake. He locates a point C that is 860 ft from A and 175 ft from B. He measures the angle at C to be 78°. Find distance AB.

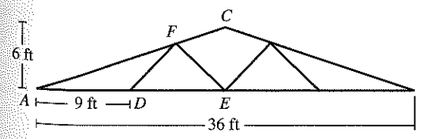


39. Construction Engineering A manufacturer is designing the roof truss that is modeled in the figure shown.

(a) Find the measure of $\angle CAE$.

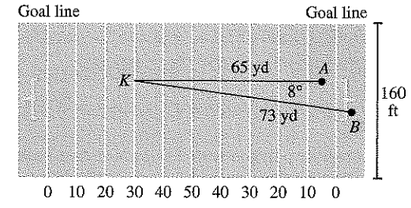
(b) If $AF = 12$ ft, find the length DF.

(c) Find the length EF.

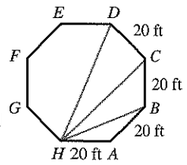


40. Navigation Two airplanes flying together in formation take off in different directions. One flies due east at 350 mph, and the other flies east-northeast at 380 mph. How far apart are the two airplanes 2 hr after they separate, assuming that they fly at the same altitude?

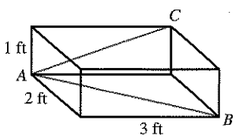
41. Football Kick The player waiting to receive a kickoff stands at the 5 yard line (point A) as the ball is being kicked 65 yd up the field from the opponent's 30 yard line. The kicked ball travels 73 yd at an angle of 8° to the right of the receiver, as shown in the figure (point B). Find the distance the receiver runs to catch the ball.



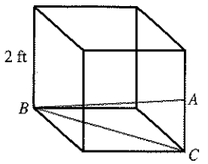
42. Group Activity Architectural Design Building Inspector Julie Wang checks a building in the shape of a regular octagon, each side 20 ft long. She checks that the contractor has located the corners of the foundation correctly by measuring several of the diagonals. Calculate what the lengths of diagonals HB, HC, and HD should be.



43. Connecting Trigonometry and Geometry $\angle CAB$ is inscribed in a rectangular box whose sides are 1, 2, and 3 ft long as shown. Find the measure of $\angle CAB$.



44. Group Activity Connecting Trigonometry and Geometry A cube has edges of length 2 ft. Point A is the midpoint of an edge. Find the measure of $\angle ABC$.



Standardized Test Questions

45. True or False If $\triangle ABC$ is any triangle with sides and angles labeled in the usual way, then $b^2 + c^2 > 2bc \cos A$. Justify your answer.

46. True or False If a, b, and θ are two sides and an included angle of a parallelogram, the area of the parallelogram is $ab \sin \theta$. Justify your answer.

You may use a graphing calculator when answering these questions.

47. Multiple Choice What is the area of a regular dodecagon (12-sided figure) inscribed in a circle of radius 12?

(A) 427 **(B)** 432 **(C)** 437 **(D)** 442 **(E)** 447

48. Multiple Choice The area of a triangle with sides 7, 8, and 9 is

(A) $6\sqrt{15}$. **(B)** $12\sqrt{5}$. **(C)** $16\sqrt{3}$. **(D)** $17\sqrt{3}$. **(E)** $18\sqrt{3}$.